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BODY COMPOSITION ANALYSIS OF FEMALE HANDBALL PLAYERS

Original research

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ABSTRACT

The aim of this research was to determine and analyse the body composition of female handball players. On the sample of 22 female handball players age (age=17.13±3.07 years, body height=167.63 ± 6.81 , body weight=59.86 ± 7.49) who play in Bosnian Woman Premier League, following parameters was measured by bioimpedance method; Body Height (cm), Body Weight (kg), Body Mass Index, Body Fat (kg), Body Fat (%), Fat Free Mass (kg), Muscle Mass (kg), Total Body Water (kg), Total Body Water (%). The mean value of Body Mass Index was 21.27 ± 2.37, Body Fat (kg) was 13.86 ± 3.60, Body Fat in percentage (%) was 23.03 ± 4.26, Fat Free Mass (kg) mean value was 46.00 ± 5.52, Muscle Mass (kg) 43.72 ± 5.15, Total Body Water (kg) was 33.22 ± 3.57, and Total Body Water in percentage (%) 55.83 ± 2.96. We can conclude that body composition profile of female handball players in our research differs from those from elite female handball players, especially in body fat and fat free mas. The optimal solution for our participants appears to be increasing of Fat Free Mass while reducing the Body Fat, to be close to body composition profile of elite female handball players. We can also conclude that players at lower levels of competitions probably need a greater amount and intensity of training to achieve similar body composition profile to players from elite level.

Keywords: body composition, handball, female handball players, body fat mass

INTRODUCTION

Several techniques are used to determine body composition of athletes, including skinfold analysis, body density measurements, bioelectrical impedance methods, and dual-energy X-ray absorptiometry (DXA). The evaluation of body composition is a key issue, especially the body content of fat and skeletal muscle (Martinez-Rodriguez et al. 2020). Excessive adipose tissue acts as a dead weight in activities where the body mass must be repeatedly lifted against gravity during locomotion and jumping (Reilly, 1996). In contrast, fat-free mass contributes to the production of power during high-intensity activities and provides greater absolute strength for resistance to high dynamic and static loads. The measurement of physical and physiological characteristics gives a great insight into the current status of handball players and allows coaches to evaluate players and implicate the right training volume and intensity to raise their abilities.

From the point of view of somatotypes and body composition as predispositions for the performance, not only tall types with long extremities are suitable, but also the types with high proportion of Fat Free Mass and low proportion of inactive Fat Mass. A significant proportion of research studies have been carried out in the male population (Musaiger et al., 1994; Jaric, Ugarkovic & Kukolj, 2001; Srhoj, Marinovic & Rogulj, 2002; Hasan et al., 2007a; Chaouachi et al., 2009; Mohamed et al., 2009; Sibila & Pori, 2009; Sporiš et al., 2010) compared to the female population (Milanese et al. 2011,2012, Bayios et al., 2006; Hasan et al., 2007, Piscitelli et. al. 2016).

METHODS

Participants

Sample of participants consisted of N = 22 female handball players, (age=17.13±3.07 years, body height=167.63 ± 6.81, body

weight=59.86 \pm 7.49) who play in Bosnian Woman Premier League.

Procedure and Sample of variables

This research included samples of 9 variables: Body Height (cm), Body Weight (kg), Body Mass Index, Body Fat (kg), Body Fat (%), Fat Free Mass (kg), Muscle Mass (kg), Total Body Water (kg), Total Body Water (%). Body composition was measured by bioelectrical impedance method (TANITA Body Scale SC-330ST).

Statistical analysis

The data was processed in SPSS (version 26.0; SPSS, Inc., Chicago, IL, USA). Basic measures of descriptive parameters were created and reported.

RESULTS

In the table 1. we can see basic anthropometric parameters for all variables. Average age of female handball players was 17.13 \pm 3.07, Body Height 167.63 \pm 6.81, Body Weight 59.86 \pm 7.49 and Body Mass Index 21.27 \pm 2.37.

Table 1. Basic anthropometric variables

	Minimum	Maximum	Mean \pm SD
Age (years)	14.00	23.00	17.13 \pm 3.07
Body Height (cm)	152.00	180.00	167.63 \pm 6.81
Body Weight (kg)	42.00	73.00	59.86 \pm 7.49
Body Mass Index	18.00	26.00	21.27 \pm 2.37

Table 2. is showing descriptive statistics for body composition variables. The mean value of Body Fat (kg) was 13.86 \pm 3.60. Body Fat percentage (%) was 23.03 \pm 4.26, Fat Free Mass (kg) mean value was 46.00 \pm 5.52, Muscle Mass (kg) 43.72 \pm 5.15, Total Body Water (kg) was 33.22 \pm 3.57, and Total Body Water percentage (%) 55.83 \pm 2.96.

Table 2. Descriptive statistics for body composition variables

	Minimum	Maximum	Mean \pm SD
Body Fat (kg)	7.00	20.00	13.86 \pm 3.60
Body Fat (%)	16.10	31.40	23.03 \pm 4.26
Fat Free Mass (kg)	35.00	61.00	46.00 \pm 5.52
Muscle Mass (kg)	34.00	58.00	43.72 \pm 5.15
Total Body Water (kg)	26.00	42.00	33.22 \pm 3.57
Total Body Water (%)	50.20	61.30	55.83 \pm 2.96

DISCUSSION

Players who have more body fat than appropriate will become tired much faster during a game than those players with optimal amount of body fat, also these

players will run slower during the second period of the game (Sporiš et al., 2010). Body Fat (kg) of female handball players in our research was 13.86 \pm 3.60, and Body Fat in percentage (%) was 23.03 \pm 4.26, which is better result than in research of Kale et. al. (2020) on the students female handball players (Body Fat (%) 32.3 \pm 4.9) and Akdogan et. al. (2022) on the sample of second league female handball players (Body Fat (%) 30.14 \pm 4.57), and close to the results of the research of Bon et al., (2015) on the sample of female junior and senior national team where Body Fat (%) was 20.03 \pm 4.44, but far away from the results of elite female handball players from the research of Mala et. al. (2011) where the percentage of Body Fat (%) was 16.06, and from the research of Moss, et. al. (2015) where the percentage on nonelite female handball players was 19.48 \pm 3.56, and 17.97 \pm 2.83 on the sample of top elite female handball players. Fat Free Mass (kg) mean value of female handball players in our research was 46.00 \pm 5.52, and on the sample of elite female handball players in the research of Mala et. al. (2011) Free Fat Mass (kg) was 60.74. Granados et al. (2008) found the values of Free Fat Mass 55.0 \pm 4 also on the sample of elite female handball players. Mean value of Muscle mass (kg) was 43.72 \pm 5.15, but we didn't find any data to compare about muscle mass measured by bioimpedance method on the sample of female handball players. Total Body Water (kg) was 33.22 \pm 3.57, and Total Body Water in percentage (%) 55.83 \pm 2.96, which is similar to results in the research of Mala et. al. (2011), on the sample of elite female handball players, where Total Body Water (%) was 54.98%.

CONCLUSION

Body composition monitoring based on targeted choice of the population (national team) showed that body fat mass values (FM) should not exceed 21.3% in elite female players when measured by the bioimpedance method (Mala et. al. 2011). The optimal solution for our participants appears to be increasing of Fat Free Mass while reducing the Body Fat, to be close to the body composition profile of elite female handball players. We can also conclude that players at lower levels of competitions need a greater amount and intensity of training to achieve similar body composition profile to those players from elite level. Our data are capable of being compared to studies, in which body composition parameters were monitored using bioimpedance analysis.

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Conflict of Interest

The authors do not have any conflicts of interest to disclose. All co-authors have reviewed and concurred with the manuscript's content, and no financial interests need to be reported.